AEROSOL PROPERTIES FROM MISR MULTI-ANGLE IMAGING OVER OCEAN

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Earth Observing System's MISR, the Multi-angle Imaging SpectroRadiometer, is a new type of satellite instrument. It will measure upwelling visible radiance from Earth in 36 channels: 4 spectral bands centered at 446, 558, 672, and 866 nm, at each of 9 emission angles spread out in the forward and aft directions along the flight path at 70.5, 60.0, 45.6, 26.1 degrees, and nadir. The data will be used to characterize aerosol amount and type, surface albedo and bi-directional reflectance, and cloud properties. MISR is scheduled for launch into a 10:30 AM, sun-synchronous, polar orbit aboard the EOS Terra spacecraft in 1999; the nominal mission lifetime is 6 years.

Aerosol retrieval simulation studies show that with the multi-angle, multi-spectral MISR data, under good observing conditions we should be able to distinguish about 3 size groupings among typical atmospheric particles ("small," "medium," and "large"), two colors ("absorbing" and "non-absorbing"), and two shapes (spherical and nonspherical) (Kahn et al., 1998; 1997).

Alternatively, we can interpret MISR observations in terms of distinctions among mixtures of aerosol types. Simulations were performed using published aerosol transport models to define mixtures, and popular choices for particle microphysical properties. Results indicate that MISR should distinguish fractional optical depths of climatologically likely mixtures containing large, spherical particles (sea salt), non-spherical particles (accumulation and coarse mode dust), and small, dark particles (black carbon), to within 20% or better of the expected values (Kahn et al., 1999). MISR is not good at distinguishing medium, spherical, non-absorbing (sulfate) from medium, spherical, absorbing (carbonaceous) particles, but the sum is retrieved to 20% or better. With this we can separate "Maritime" from "Continental" aerosol air masses.

Additional data from field measurements taken within air masses will still be needed to characterize particle single scattering albedo in enough detail to satisfy the needs of climate modelers. But the anticipated results represent a major step beyond current satellite-derived aerosol products, which retrieve total column optical depth for assumed particle properties. All being well, early results with data from the EOS mission will be presented.

O = Oral Presentation, Session = A. Satellite Measurements